Enhanced Branching Morphogenesis and Pluripotent Cell Lineage Differentiation for Pediatric Regenerative Therapies

Grant Award Details

Enhanced Branching Morphogenesis and Pluripotent Cell Lineage Differentiation for Pediatric Regenerative Therapies

Grant Type: Inception - Discovery Stage Research Projects

Grant Number: DISC1-10598

Project Objective: The objective of this project is to use hiPSCs and biodegradable scaffolds to develop renal organoids for use as in vitro models of study, and eventually as platforms for pediatric kidney repair

Investigator:

Name:	Alice Tarantal
Institution:	University of California, Davis
Type:	PI

Disease Focus: Kidney Disease

Award Value: $235,800

Status: Active

Grant Application Details

Application Title: Enhanced Branching Morphogenesis and Pluripotent Cell Lineage Differentiation for Pediatric Regenerative Therapies

Public Abstract:

Research Objective

Approximately 20,000 babies are born annually with kidney disease; the long-term outcome is poor. These studies address new ways to develop mini-kidney structures for transplantation to induce repair.

Impact

~85% of people on the organ waitlist are in need of a kidney and there are insufficient donors. There is a pressing need to identify methods for repair that avoid the need for an organ transplant.

Major Proposed Activities

- Address a way to create mini-organs in 3D using growth factors, a biodegradable scaffold, and cell differentiation techniques that recapitulate kidney development and the required cell interactions.
- Investigate the interactions between cells that induce each other by layering components and determining if structures needed are enhanced, and in a rigorous and reproducible manner.
- Compare in a quantitative and qualitative manner the characteristic features required such as branching in layered 3D structures and the capabilities of cells to self-organize, interact, and mature.
- Evaluate the effects of oxygen in the culture environment in which the cells and future mini-kidneys are grown to determine if the structures are enhanced and necessary vessels form.
- Identify a candidate kidney construct with the necessary elements for future transplantation in a translational animal model of congenital kidney disease.
- Publish the results and share outcomes on the CIRM and related websites.

Statement of Benefit to California:

Current data on the Organ Procurement and Transplantation Network show that across the U.S. 96,986 individuals are currently awaiting a kidney and there are only 17,155 donors in 2017, to date. For the State of California, 19,525 (~85%) are in need of a kidney. Of these ~250 represent children under 17 years of age. The studies in this proposal address the urgency in identifying solutions for repair and regeneration that will benefit the State of California and the youngest citizens in need.

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